Breeding Bird Distribution and Abundance in the Barren Islands, Alaska

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The intent of visiting the Barren Islands was to conduct basic biological reconnaissance of this area which has been proposed as a National Wildlife Refuge. These islands are part of the approximately 31 million acres of public lands withdrawn by the Department of Interior in 1973 for the creation of new refuges in Alaska.

Primary goals of the Barren Islands expedition were to: 1. locate seabird colonies on the islands, 2. determine species composition of nesting marine birds, 3. estimate breeding populations, 4. ascertain marine mammal species composition, distribution, and abundance, and 5. document terrestrial flora and fauna.

The Barren Islands (58°55′N, 152°10′W) are located in the middle of the entrance to Cook Inlet between the Chugach Islands south of the Kenai Peninsula and Shuyak Island north of Kodiak. The Gulf of Alaska lies east of the islands, and Shelikof Strait is situated to the southwest. The seven named islands in the Barrens (figure 1), ranging in size from 6935 acres to 25 acres and totalling 10,000 acres, spread over an area about 13 miles long and 5 miles wide. The highest elevation, 1935 feet, is attained on Ushagat Island. Ushagat has several lakes, the largest of which is 25 acres, and a 100-acre body of water surrounded by trees on this island changes over the years from a lake to a lagoon, as the outlet is open to the sea in some years.

Tidal currents of considerable velocity occur in the Barren Islands with the flood current setting approximately northwestward and the ebb southeastward (U.S. Coast and Geodetic Survey 1964). Severe tide rips and strong winds occur in the vicinity of the islands and are frequently dangerous for small vessels. The wind and ocean currents among the islands are usually much stronger than a few miles away. Tide rips produce upwellings where food for marine birds and mammals is more readily available. Slack waters do not occur in the Barrens at the change of tides, and tidal vicissitudes exceed 20 feet at certain times of the year.

Although Homer is only 55 miles from the Barren Islands, the climate in the Barrens is probably more similar to that of Kodiak, 80 miles distant. Homer is in the lee of the Kenai Mountains and thus receives an average of only 23.06 inches of precipitation compared to 56.71 inches per year in Kodiak. The annual mean temperature for the Barren Islands is probably about 40°F, as annual means for Kodiak and Homer are 40.7°F and 36.5°F, respectively. The annual mean wind velocity in the Barrens is surely considerably higher than that of Kodiak where it is 10.1 mph. The prevailing wind direction most of the year is northwest in Kodiak and northeast in Homer. Cloud cover, mainly fog, is most extensive in the Barren Islands region during spring and summer. Sky obscuration in Kodiak ranges from an average of 61 percent in January to 84 percent in May.

Beach plant communities in the Barren Islands are composed mainly of *Elymus arenarius mollis, Honckenya peploides, Mertensia maritima, Lathyrus maritimus,* and *Senecio*

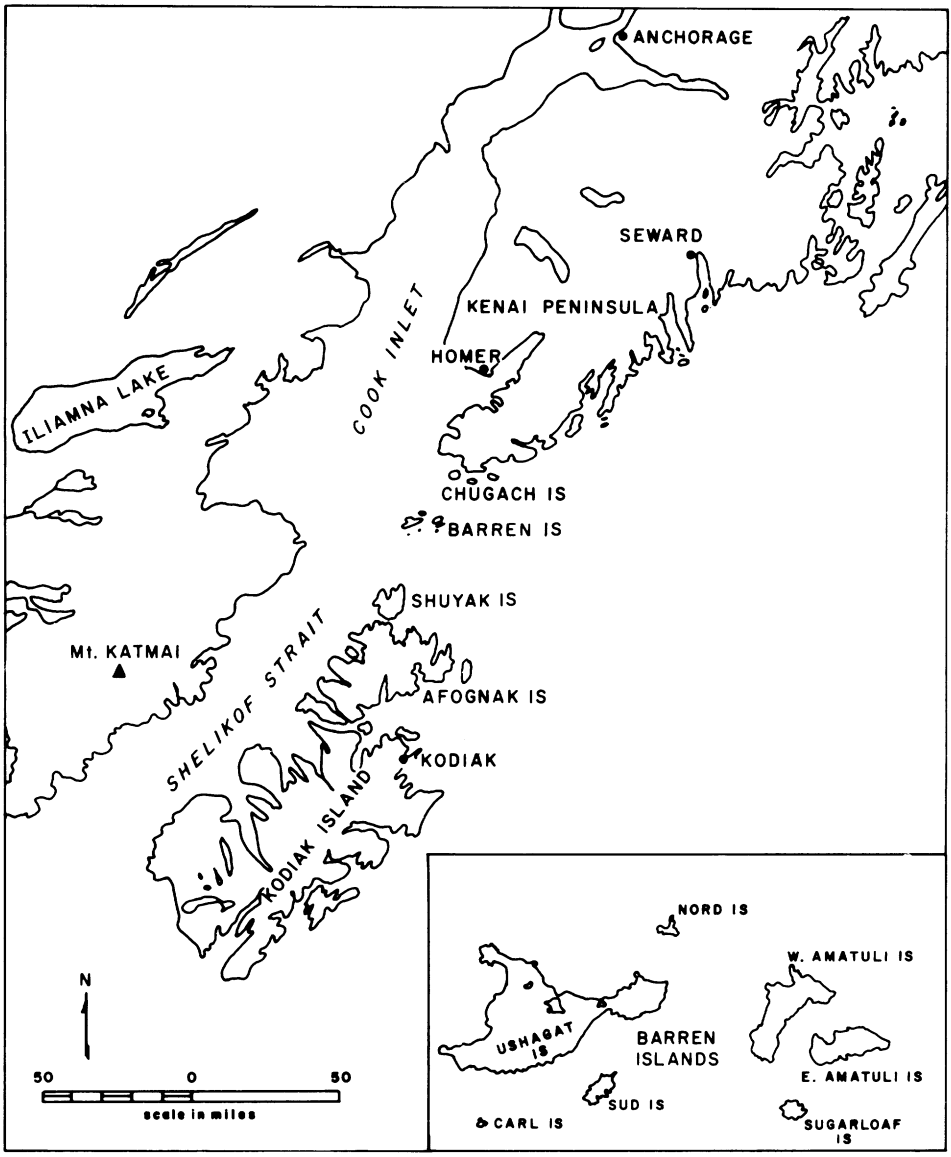

FIGURE 1. Location of the Barren Islands on the south coast of Alaska.

pseudo-arnica. Vegetation on East Amatuli, Sugarloaf, Sud, Nord, and Carl Islands is principally grasses and sedges. On Ushagat and West Amatuli, the largest islands, grass-sedge communities dominate lower elevations and windward slopes, while crowberry (*Empetrum nigrum*) associations prevail in higher locales and leeward slopes.

Ushagat Island is largely covered by alpine tundra plants, such as *Empetrum, Anemone, Lupinus, Silene, Arctostaphylos,* and *Potentilla.* Dwarf birch (*Betula nana*) and willows (*Salix* spp.) occur along some streams and poorly drained areas. Sitka spruce (*Picea sitchensis*) groves occur only on Ushagat and lie in relatively flat areas somewhat protected by mountains. Several hundred acres of dense spruce encircle the

large lagoon on the north side. Dolly Varden (*Salvelinus malma*) inhabit this lagoon into which several streams flow. This forested area is sheltered from south winds which usually buffet the island. The south side of the island frequently is in fog which dissipates as it descends the warmer leeward slopes. Seventy-six species of vascular plants were collected on Ushagat, the island which appears to have the greatest diversity.

Vegetation on East Amatuli and Sugarloaf is generally more lush than on the other islands. The lush, tall grass interspersed with *Heracleum lanatum, Ligusticum scoticum,* and other members of the family Umbelliferae on the above two islands is similar to the dense vegetation on many of the Aleutian Islands. Since East Amatuli and Sugarloaf are the easternmost Barren Islands and southeasterly winds from storms entering the Gulf of Alaska bring the most precipitation, these islands probably receive more moisture, and fog appears to persist there longer than around Ushagat, the driest and westernmost island. This increased moisture plus nutrients supplied by large numbers of seabirds probably contribute to the lusher vegetation on these islands and on the east side of West Amatuli.

The seabird colonies of the Barren Islands have not been previously described. Literature and museum specimens of avifauna from nearby Kodiak Island were analyzed by Friedmann (1935). Murie (1959) documented bird data along the Alaska Peninsula and westward into the Aleutians. Statewide records, including the Barrens region, are treated by Gabrielson and Lincoln (1959). The most recent work for the Gulf of Alaska east of the Barrens has been done by Isleib and Kessel (1973).

METHODS

Expeditions were made to the Barrens in July 1974 and 1975 with a total of 21 days spent on the islands. In 1974 the period of 1-9 July was spent on Ushagat Island with a brief visit to Nord and Sud Islands. Outboard motor failure prevented exploration of other islands. The camp on Ushagat Island was established on the shore of the 100-acre lagoon which proved suitable for landing by a Grumman Goose aircraft.

After an aborted aircraft landing at Amatuli Cove the base camp for the 7-18 July 1975 expedition again was situated on Ushagat Island. In 1975, however, all of the seven Barren Islands were explored, and camps were established on all islands except the smallest ones, Nord and Carl, which have no beaches for boat landing. A night visit was made to Nord Island to ascertain the presence of nocturnal seabirds.

Ushagat Island (6935 acres) was intensely explored by foot in 1974, and two trips around the island were made by boat. Bird and mammal observations were recorded, and many plants were collected and identified. Mist nests were erected in the island's main spruce stand to monitor passerines.

A 16.5-foot Avon rubber boat with outboard motors was used to travel around the islands. The shoreline of every island was surveyed under favorable wind, visibility, and sea conditions at least once by boat as close to the beach as possible, usually within 100 feet. Frequent stops to identify and estimate bird and mammal numbers or take photographs were made where sea conditions permitted. The interior areas of all islands were explored afoot as much as time and fog allowed. Searches for nocturnal bird colonies were made afoot during nights near campsites.

Population estimates were based on actual nest or bird counts for small cliff colonies of cormorants, kittiwakes and murres. Estimates of big colonies of cliff-nesters represent extrapolations from counts on portions of the colony and/or counts by 100's of the

entire colony. Gull population estimates represent the number of individuals recorded in a given colony.

Tufted Puffin (*Lunda cirrhata*) populations were estimated by enumerating and extrapolating from burrows when visible from the boat. Puffin numbers based on burrow counts are questionable since many holes are obscured by vegetation and the occupancy percentage of burrows is unknown. Population estimates for colonies where most burrows were hidden by vegetation were derived from the number of birds observed. Some colony sizes represent a combination of burrow counts and estimates of the number of birds present at the time of the visit. Colony size estimates based on the number of puffins seen must be regarded as unreliable since only a fraction of the population is evident at a given time unless the count happens to coincide with the period most birds are exchanging incubation chores. Colonies of crevice-nesters, such as Parakeet Auklets (*Cyclorrhynchus psittacula*) and Horned Puffins (*Fratercula corniculata*), were estimated from observed numbers in the area and thus also represent a minimum population level. No estimates were made for noctural birds, except at one colony.

Estimates of seabird numbers on all islands are for adult birds, generally breeders, as no birds-of-the-year were evident in early July (table 1). The peak population is experienced in August after hatching and prior to departure to sea. Prospecting prebreeding birds also augment the breeding population in late July and August.

RESULTS AND DISCUSSION

USHAGAT ISLAND

Although Ushagat Island represents 70 percent of the land area in the Barren Islands and has roughly 23 miles of coastline, it has practically no seabird colonies. Estimates given in table 1 for Tufted Puffins are based on visible burrows and the greatest number of birds noted on successive visits. Thus these estimates must be considered minimal population indices.

This paucity of birds is partly attributable to the introduction of 21 arctic foxes (*Alopex lagopus*) in 1928 (U.S. Bureau of Land Management files). Although the fox farming lease terminated in 1939, fox trails are obvious above the cliffs and traverse old puffin burrows on grassy headlands on the island's northwest sector. The fox population appears very low; none were seen and only one was heard barking. The island's large ground squirrel (*Citellus undulatus*) population also may adversely affect burrow nesters. Although storm-petrels would seem fairly secure from foxes if they nested among rocks, none were found on Ushagat despite much talus, especially in the Table Mountain area. Since the vegetation on Ushagat generally is much less lush than on the other Barrens and is more characteristic of alpine tundra, much of this island seems less suitable for burrowing seabirds.

Based on 1974 observations on Ushagat, which spanned a longer period than in 1975, an estimated 20 Black Oystercatchers (*Haematopus bachmani*) and 250 Pigeon Guillemots (*Cepphus columba*) inhabited the island. Also, 70 Harlequin Ducks (*Histrionicus histrionicus*) were recorded in 1974, compared to 30 the following year. Seven White-winged Scoters (*Melanitta deglandi*) were spotted both years. Western (*Calidris mauri*) and Least sandpipers (*C. minutilla*), Northern Phalaropes (*Lobipes lobatus*), and Parasitic Jaegers (*Stercorarius parasiticus*) also were present. Two pairs of jaegers nested on Ushagat in 1974.

Ten Bald Eagles (*Haliaeetus leucocephalus*) were seen in 1975. An active nest seen

TABLE 1. Estimated July Bird Populations on the Barren Islands

SPECIES	Ushagat	Nord	Sud	Carl	Sugarloaf	East Amatuli	West Amatuli	Total
Red-throated Loon	2					2		—
Northern Fulmar						20		20
Sooty Shearwater								A (offshore)
Short-tailed Shearwater								A (offshore)
Fork-tailed Storm-Petrel			C		A	A	C	
Cormorant (3 species)	200	40	70*	50	240	30	870	1,500
Harlequin Duck	50		4			7		60
Common Eider							4	4
White-winged Scoter	10							10
Surf Scoter	P							—
Merganser sp.			P					—
Bald Eagle	9	3	2	2	1	5	6	28
Peregrine Falcon			2					2
Rock Ptarmigan	20		2					22
Black Oystercatcher	20	8	4		2	10	4	50
Semipalmated Plover	U							—
Common Snipe	P							—
Least Sandpiper	U						U	—
Dowitcher sp.			P					—
Western Sandpiper	U		U					—
Northern Phalarope	U							A (offshore)
Parasitic Jaeger	4							4
Glaucous-winged Gull	240*	80	500		1,600	450	2,300	5,200
Mew Gull	U							—
Bonaparte's Gull	P							—
Black-legged Kittiwake	500*	20,000				13,000	300	33,800
Common Murre		30,000		4*		61,000	10	91,000
Thick-billed Murre						U		—
Pigeon Guillemot	250	8	20		16	50	70	420
Marbled Murrelet		U						—
Kittlitz's Murrelet						P		—
Ancient Murrelet		2						—
Parakeet Auklet	10	400	20			360	120	920
Rhinoceros Auklet			1,000					1,000
Horned Puffin	250	40	400	40	600	13,000	1,300	15,700
Tufted Puffin	100	5,000	1,000	1,000	9,500	95,000	93,000	205,000
Bank Swallow	U					U		—
Common Raven	U	C	C	C	C	C		—
Northwestern Crow	P							—
Varied Thrush	U							—
Hermit Thrush	C							—
Golden-crowned Kinglet	U							—
Water Pipit	A		C			C	A	—
Orange-crowned Warbler	U							—
Yellow Warbler	U							—
Wilson's Warbler	U							—
Gray-crowned Rosy Finch	C	C		U		C	A	—
Common Redpoll	C						U	—
Pine Siskin	U							—
White-winged Crossbill	C							—
Savannah Sparrow	A	C	A	C	C	A	C	—
Golden-crowned Sparrow	C		U		U	C	U	—
Song Sparrow	U	U		U	U		U	—

* no colony

P—present (one observation)

U—uncommon
C—common
A—abundant

in 1974 on the northwest cape beside a cliff was not rechecked in 1975, but two eagles were soaring in the area. An inactive nest was found atop a tree on the west side of the island.

Approximately 600 northern sea lions (*Eumetopias jubata*) were hauled out on rocks one quarter mile off the southwest tip of Ushagat, but none were seen on the island itself either year. Another 100 sea lions occupied a rock a mile west of the island's northwest cape. In 1975, 63 harbor seals (*Phoca vitulina*) and 41 sea otters (*Enhydra lutris*) were counted around Ushagat, compared to approximately 300 seals and 150 sea otters the previous year. All counting was done by boat in 1975, whereas some animals were counted on foot the prior year. Although many hauled out individuals enter the water upon hearing the approaching boat, there appeared to be fewer seals and sea otters around Ushagat in 1975.

Ushagat Island had the greatest diversity of terrestrial birds of any of the group (table 1), as it is the largest island and the only one with timber. Savannah Sparrows (*Passerculus sandwichensis*) were the most abundant passerines in open areas at lower elevations, while Common Redpolls (*Acanthis flammea*) dominated forested areas. Water Pipits (*Anthus spinoletta*) and Rock Ptarmigan (*Lagopus mutus*) were the only species found on mountain tops. Gray-crowned Rosy Finches (*Leucosticte tephrocotis*) were more common along beaches on this island rather than at the customary higher elevations. Foxes probably have greatly reduced the ptarmigan, as only two adults and a brood of six were observed. Foxes apparently account for the lack of waterfowl nesting on Ushagat, for fox trails are prominent around the island's lakes and ponds. Shorebirds undoubtedly also are adversely affected; no gull colony exists on this large island.

NORD ISLAND

This 90-acre rocky island rises to 690 feet and has the greatest seabird density of any of the Barrens. In 1975, an estimated 10,000 pairs of Black-legged Kittiwakes (*Rissa tridactyla*) and 30,000 Common Murres (*Uria aalge*) nested on the island's cliffs, primarily on the north and east sides.

Four hundred Parakeet Auklets were observed in the northwest bight both years. Auklets were noted flying to and from crevices on the boulder-strewn beach. This appears to be the largest Parakeet Auklet colony encountered in the Barrens. About 2500 pairs of Tufted Puffins occupied the grassy portions of the island above the cliffs, and 40 pairs of Glaucous-winged Gulls (*Larus glaucescens*) nested on the summit. A few Red-faced Cormorants (*Phalacrocorax urile*) and Pigeon Guillemots also inhabit the island. Two Ancient Murrelets (*Synthliboramphus antiquus*) were seen on two occasions off the southeast point of the island, and roughly 1500 Northern Phalaropes and 500 mixed Sooty (*Puffinus griseus*) and Short-tailed (*P. tenuirostris*) shearwaters were noted between Nord and West Amatuli islands.

Nesting seabirds were still incubating eggs. One excavated Tufted Puffin egg had an embryo which appeared a few days from hatching; one gull nest with two pipping eggs was discovered. Hatching young were noted in one Red-faced Cormorant nest on 2 July 1974. No nocturnal seabirds were detected when the island was visited after dark.

Passerine birds on Nord Island included Gray-crowned Rosy Finch, Savannah Sparrow, and Song Sparrow (*Melospiza melodia*) (table 1). Two adult and one juvenile Bald Eagles were on the island. An abandoned nest was situated on the southwest end.

Fifteen harbor seals and 12 sea otters were found at Nord Island. Several killer whales

(*Orcinus rectipinna*) and dolphins plied through the tide rips north of the island and between Nord and Ushagat islands.

SUD ISLAND

This 300-acre grassy island rises to 980 feet at the southwestern end, while the northeastern part is relatively flat with a few ponds and springs. There is a good landing beach on the north side of the island.

A Rinoceros Auklet (*Cerorhinca monocerata*) colony was discovered on the north side of the island on 15 July 1975. This is the only colony described outside of southeast Alaska; Rhinoceros Auklets are considered accidental west of Yakutat (Gabrielson and Lincoln 1959). Islieb and Kessel (1973) regard them as rare visitants and probable breeders in the region. Roseneau (pers. comm.) saw two individuals near East Amatuli Island in 1965, and Atwell (pers. comm.) indicated a few had been seen around Kodiak Island during the summer of 1975.

Forty-three 6 x 100-foot quadrats were established to census the Rhinoceros Auklet colony, which was principally in beach rye (*Elymus arenarius mollis*) and *Festuca rubra* situated on a 30° north slope between 140 and 260 feet elevation above sea level. The density of burrows on the quadrats ranged from three to 19, and a total of 531 holes was counted, including those on the periphery of the colony and slightly outside the quadrats. Most burrows were in loam on a well-drained ridge. Fresh dirt, feces, and feathers showed that most of the burrows were active. Undoubtedly some peripheral burrows were missed in the count and some of those counted were inactive or interconnected. Keeping these factors in mind the colony was estimated at approximately 500 pairs. Twelve birds were seen offshore during three daytime trips around the island, but none were flushed from burrows during daylight hours.

A Fork-tailed Storm-Petrel (*Oceanodroma furcata*) colony was located in a rock slide covered with lichens and moss just above the Rhinoceros Auklet colony. Hundreds of petrels were heard calling and flew about the island between 23:30 and 2:30 ADT. This petrel colony was not discovered in 1974 because we did not camp on the island. Since the petrels nested in a talus slope, it was impossible to estimate colony size. None were seen around the island during daylight hours.

Other seabirds recorded breeding on Sud Island included cormorants; 250 pairs of Glaucous-winged Gulls; Pigeon Guillemots; Parakeet Auklets; and approximately 700 pairs of puffins, mainly Tufted Puffins. The gull population appeared much greater in 1974, and week-old chicks and incubated eggs were found in the gull colony located atop the island. About 400 Black-legged Kittiwakes bathed in the ponds in 1974.

One adult and one immature Bald Eagle inhabited Sud Island, and one Peregrine Falcon (*Falco peregrinus*) was spotted flying toward cliffs on the southeast side of the island. No other peregrines were sighted in the Barrens either summer.

Passerine birds seen included Common Ravens (*Corvus corax*), Water Pipits, Savannah Sparrows, and Golden-crowned Sparrows (*Zonotrichia atricapilla*). One Rock Ptarmigan was noted on the summit, and Harlequin Ducks, Western Sandpipers, Black Oystercatchers, and an unidentified dowitcher (*Limnodromus* sp.) were seen on the north beach.

More sea otters (71) were counted around Sud Island in 1975 than any other of the Barren Islands; most were on the southeastern side. A total of 120 sea otters and 250 harbor seals was reported the previous year. Hoary marmots (*Marmota caligata*) abound

on the island. They were probably introduced by the Military, which evidently had a communications outpost there during World War II.

CARL ISLAND

This 25-acre island is the smallest named island in the group. The shoreline consists of cliffs and boulders with lush grass above to the 380-foot summit.

The vegetated portion of the island was occupied by approximately 500 pairs of Tufted Puffins. A few Red-faced Cormorants and Horned Puffins nested in rocky areas. Although two Bald Eagles were present, no nest was found. Night observations were not made, but storm-petrel colonies were unlikely. Common Ravens, Gray-crowned Rosy Finches, Savannah Sparrows, and Song Sparrows were the only passerines found.

Approximately 400 northern sea lions were hauled out, but no pups were visible. Seventy sea otters were noted, the highest density anywhere among the islands. Most of the pods were in kelp-choked coves on the west and south sides. No birds or sea mammals occupied rocks a mile south of Carl Island.

SUGARLOAF ISLAND

This island rises abruptly in the center to 1210 feet and covers 200 acres. Only one marginal landing site exists on a tiny steep beach on the northwest side of the island; the 2.5 mile remaining coastline consists of boulders and cliffs. A 75-foot high rock lies three quarters of a mile to the south. The island swarmed with insects, mainly flies, probably because of the presence of sea lions. No fresh water existed, save a few seeps.

Higher portions of the island are riddled with puffin burrows, and an estimated 10,000 birds were observed, mainly Tufted Puffins on the south side. Most burrows on this lush island were concealed by vegetation; so the estimated breeding population based mainly on the number of puffins around the island during our stay is probably very conservative. Thousands of Fork-tailed Storm-Petrels nest on the island with many nesting in rock slides at the northwest sector. Glaucous-winged Gulls, approximately 800 pairs, nested near the summit. Nearly 100 cormorant nests were counted; Pelagic Cormorants (*Phalacrocorax pelagicus*) predominated with Double-crested (*P. auritus*) and Red-faced cormorants present in small numbers. Pigeon Guillemots were scattered around the island.

The only raptor observed was a single juvenile Bald Eagle. Savannah Sparrows, Golden-crowned Sparrows, Song Sparrows, and two Common Ravens were the only other land birds.

Nearly all of the sea lions in the Barrens inhabit Sugarloaf. Since an Alaska Department of Fish and Game sea lion branding crew arrived at the time of our visit, we relied on their census data. They tallied 4500 adult sea lions and 3500 pups (Caulkins, pers. comm.).

EAST AMATULI ISLAND

This mountainous island covers 1075 acres, has 7 miles of coastline, and is surmounted by 1539-foot Puffin Peak. Vegetation on East Amatuli is more lush than any of the other islands. A few wind-blown Sitka spruce grow on the island. Amatuli Cove is the only suitable landing site, but the cove is subject to high winds, particularly from the southeast. Several creeks flow into the cove.

East Amatuli Island has the largest seabird population in the Barrens (table 1). A Common Murre colony of roughly 61,000 birds exists on the eastern end along with approximately 3500 pairs of Black-legged Kittiwakes. A small murre colony is situated at the southwestern end where two dark phase Northern Fulmar (*Fulmarus glacialis*) colonies of only five pairs each also were found. Fulmars were not seen elsewhere in the Barrens, and none were reported on East Amatuli in 1965 (Roseneau, pers. comm.).

Puffins, mostly Tufted, abound around the entire island with a total estimate of at least 54,000 pairs. Puffin burrows are more numerous at the western and southwestern portions of the island. A colony composed of at least 2000 pairs of Horned Puffins was located west of Amatuli Lighthouse on a rocky headland. East Amatuli Island was circumnavigated entirely only once because of fog and rough seas, so estimates were based on one inspection of the colonies. Subsequent visits may reveal much higher numbers of puffins. Lush vegetation concealed many burrows, especially where they were not dense. A steady stream of puffins and murres interchanged between the island and feeding areas to the southwest.

Approximately 50 pairs of Parakeet Auklets nested on the west side of Amatuli Cove, and the same number nested along the west end of the island. The largest Parakeet Auklet concentration was along the island's south side, but no birds were noticed flying to and from the adjacent boulder beach, a likely nesting area.

Pigeon Guillemots chiefly occurred on the north side of the island. Only 15 pairs of Red-faced Cormorants were recorded. No gull colony was noted, though the Puffin Peak area was not explored afoot because of fog. The 300 gulls along the north shore probably came from the big colony on West Amatuli Island. Roseneau (pers. comm.) reported a gull colony on the west end in 1965.

A Kittlitz's Murrelet (*Brachyramphus brevirostris*) was flushed from dense grass on a steep, rocky slope at 450 feet elevation on the north coast. Attempts to find an egg were futile and were complicated by puffin burrows. This bird probably was nesting here, an atypical place for a species whose few known nests have all been found in talus in mountains far from the coast (Bailey 1973).

Fork-tailed Storm-Petrels swarmed around Amatuli Cove after dark. A mammoth colony exists in rock slides above a lake near the center of the island. On 11 July a recently hatched egg was removed from beneath rock rubble where birds were heard during the day. Only one petrel was seen during daylight hours. Leach's Storm-Petrel (*Oceanodroma leucorhoa*) also may be present, but none were heard. East Amatuli appeared to have the largest petrel population in the Barrens.

One adult and four immature Bald Eagles inhabited East Amatuli. A Peregrine Falcon nest was found inside Amatuli Cove in 1965 (Roseneau, pers. comm.). Other observations included Red-throated Loon (*Gavia stellata*), Harlequin Duck, Black Oystercatcher, Bank Swallow (*Riparia riparia*), Common Raven, Water Pipit, Gray-crowned Rosy Finch, Savannah Sparrow, and Golden-crowned Sparrow. Roseneau noted a Mallard (*Anas platyrhynchos*) brood in Amatuli Cove 10 years ago.

WEST AMATULI ISLAND

A camp was established in the cove on the northwest end of the island beside a creek. This site is the only suitable landing place on the island, which has a precipitous 10-mile shoreline rising to over 1300 feet along a ridge traversing its length.

A Fork-tailed Storm-Petrel colony was located in a moss-covered talus slope in the northwest cove. The number of birds swarming about after dark appeared less than

at Sugarloaf and about the same as on Sud Island. Night observations were not made on other parts of the 1725-acre island. This storm-petrel colony, the most northerly in the Barrens, represents the northernmost colony described in the Pacific. According to Harris (1974) and Gabrielson and Lincoln (1959) St. Lazaria Island at Sitka, Alaska, was previously regarded as the most northerly known colony. However, Palmer (1962) indicates fork-tails as irregular or former breeders as far north as Kodiak and Prince William Sound. Fork-tail eggs reputedly were collected on Kodiak Island in 1884 (Friedmann 1935). Isleib and Kessel (1973) state that the only fork-tail colony in the Prince William Sound region was found on the Wooded Islands; however, discussions with Isleib indicated that this was an assumption based on petrels observed around the islands at night.

The largest Glaucous-winged Gull colony in the Barren Islands, approximately 900 pairs, is situated on top of the ridge on the northeast end of West Amatuli. One nest with three eggs was found. A small gull colony also exists near the southwest end of the island.

Below and south of the largest gull colony lies the largest Tufted Puffin colony in the Barrens. An estimated 40,000 pairs were present during one of the three visits to the colony. Burrows were dense with at least 10,000 visible holes. On 10 July, puffins were numerous on the water below the headlands and thousands were standing in the grass at burrow entrances. Apparently birds were exchanging incubation duties at the time of this visit, for far fewer birds were seen on two subsequent visits. Several smaller puffin colonies were located elsewhere on West Amatuli.

Three large mixed cormorant colonies, chiefly Red-faced Cormorants, exist on the island's southeastern tip. Parakeet Auklets occurred near the southwestern and northwestern tips, but nesting was not ascertained.

Loafing Black-legged Kittiwakes, presumably from the colony on nearby East Amatuli, were encountered on West Amatuli's northeast cape. Pigeon Guillemots were most common at the north end. One Marbled Murrelet (*Brachyramphus marmoratus*) was spotted northwest of the island.

SUMMARY

The Barren Islands, located at the entrance to Cook Inlet 200 miles south of Anchorage, were visited in July 1974 and 1975. All seven islands were surveyed both by boat and at least partly afoot during the three weeks in the islands.

The main purpose of the survey was to determine species composition, distribution, and abundance of seabirds and marine mammals of the area, which is a proposed new National Wildlife Refuge.

A total of 55 species of birds was found in the Barren Islands with a minimum estimated 355,000 adult seabirds, not including storm-petrels, which are nocturnal and difficult to estimate. The breeding bird population of the Barrens probably exceeds 500,000 when storm-petrels are added. Species composition and population estimates were determined for each island. Largest seabird numbers were found on East Amatuli Island. Fork-tailed Storm-Petrels, Black-legged Kittiwakes, Common Murres, and puffins were the most common species. A Rhinoceros Auklet colony was discovered on Sud Island, and a few Northern Fulmars nest on East Amatuli Island, where Kittlitz's Murrelets also probably nest. Nineteen terrestrial birds, including Peregrine Falcon, were recorded, and 76 species of plants were identified on Ushagat Island.

Approximately 9100 northern sea lions, 225 sea otters, and 150 harbor seals were

recorded. Most of the sea lions occur on Sugarloaf Island, where 3500 pups were counted in 1975. Sud Island had the greatest sea otter population, while Ushagat Island had the most seals.

The introduction of arctic foxes to Ushagat Island in 1928 for fur farming evidently has severely reduced bird numbers. These predators should be eliminated after acquisition of the islands as a refuge. Except for commercial fishing the islands receive virtually no public use.

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